AEM 3X1

INSTRUCTIONS

Safety

This instruction sheet gives details of safe installation and operation of the ***AEM 3X1*** electricity meter. Safety may be impaired if the instructions are not followed. Labels on each meter give details of equipment ratings for safe operation. Take time to examine all labels before commencing installation. Safety symbols on the meter have specific meanings.

Refer To User Manual

Risk of Electric Shock

> ***WARNING***
> The meter contains no user serviceable parts.
> Installation and commissioning should only be carried out by qualified personnel

Further information is available at www.elcomponent.co.uk

Note: The AEM 3X1 available in two versions.

i) AEM 3X1

ii) AEM 3X1 V

The 'V' suffix denotes that the meter is compatible with voltage output current transformers. **The two types are <u>not interchangeable.</u>**

Three Meters in One

The ***AEM 3X1*** consists of three multi-function electricity meters in a single enclosure. The unit independently monitors up to three single-phase loads providing a clear digital displays of kW, kWh, volts and amps. The circuits to be measured may be as follows:

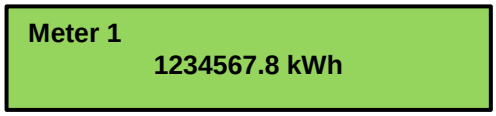
i) 3off single phase loads on the same phase (common reference voltage)

ii) 3 off single phase loads on two or three different phases (separate reference voltages)

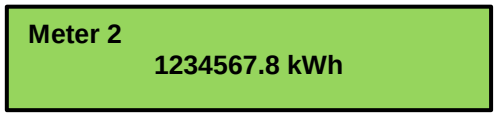
Three pulse outputs are also available allowing each kWh register to be remotely monitored/logged. An RS485 Modbus RTU serial communications link is fitted providing multi-function meter readings to remote data acquisition systems.

Energy Displays

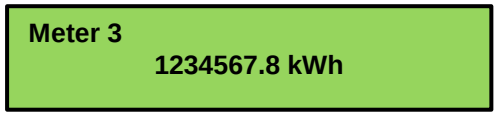
Press kWh ▲ to select the kWh register for each meter.



Active Energy Register - Meter 1



Active Energy Register - Meter 2



Active Energy Register - Meter 3

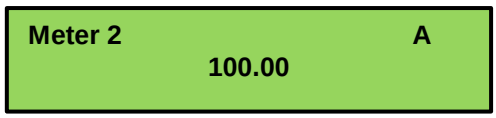
Scaling of the energy registers is set by the nominal input currents and voltages and remains constant during operation of the meter.

Energy registers will each accumulate from zero to 99,999,999 then restart from zero.

Current & Voltage Displays

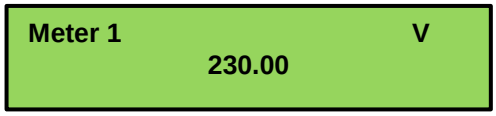
Press I/V ◄ to select from the following displays;

True RMS Amps - Meter 1

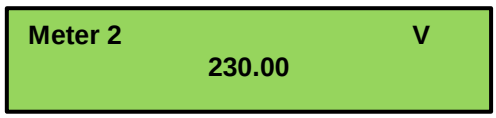


True RMS Amps - Meter 2

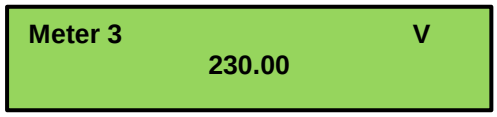
True RMS Amps - Meter 3



True RMS Volts - Meter 1



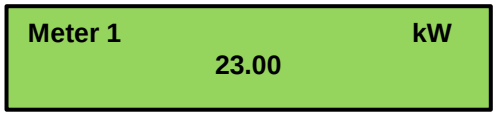
True RMS Volts - Meter 2



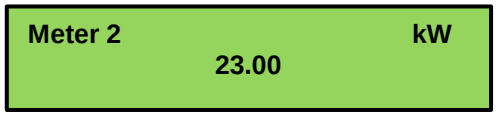
True RMS Volts - Meter 3

kW Displays *1.1*

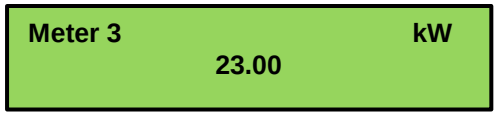
Press kW to select from the following displays;



Active Power - Meter 1



Active Power - Meter 2



Active Power - Meter 3

Pulse Outputs

Three isolated pulse outputs are provided

Pulse 1 is associated with the active energy (kWh) register of Meter 1, Pulse 2 with Meter 2 and Pulse 3 with Meter 3.

The pulse rate (amount of energy associated with each pulse) and pulse length is programmable and may be set to suit the external system.

Pulse outputs take the form of a volt free contact closure.

- Pulse 1 provides a momentary short circuit between contacts C and P1 for each programmed increment on meter 1.
- Pulse 2 provides a momentary short circuit between contacts C and P2 for each programmed increment on meter 2.
- Pulse 3 provides a momentary short circuit between contacts C and P3 each for each programmed increment on meter 3.

Pulse LED

A Light emitting diode (LED) on the front panel of the instrument remains ON during each output pulse of the meter showing on the display at the time.

Pulse Output Indicator

PROGRAMMING

Programming Menu

To enter programming mode:

Hold I/V and kWh together for 5 Seconds.

A ***Security Code*** may be required before changes to programmed parameters are allowed. This is only required if a ***Security Code*** greater than zero is set via serial communications. This is then stored in non-volatile memory during power interruptions.

4 Digit Security Code

To Enter the Security Code:

Press kWh or kW to change each digit. (Lowest significant digit first).

Press I/V to select next most significant digit.

When a valid code is entered, the first page of the programming menu is displayed.

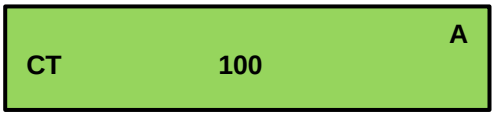
Programming Menu First Page

Setting the CT primary current

External current transformers (CTs) are required to reduce large currents to a level accepted as inputs to the meter. The AEM 3X1 meter displays require scaling to match the primary current rating of the external Current Transformers used.

Each meter in the unit uses the same CT primary current rating.

Press kWh or kW to select the Next/Previous CT Primary current from the preferred list.



Setting The CT Primary Current

Fine Adjust CT Primary

If values other than those found in the preferred list are required use *Fine Adjust Mode:*

Hold I/V and kWh together for 2 Seconds to select/deselect *Fine Adjust Mode "CTF"*.

Press kWh or kW to increment the CT Primary current in steps of 5A.

When the desired CT primary current has been set press I/V to move to the next parameter.

Setting The Pulse Output Rate

The amount of energy associated with each momentary pulse output may be programmed. A single setting is required to scale all three Meter pulse outputs.

Setting The Pulse Output Rate

Press kWh or kW to select the Next/Previous **Pulse Rate** from the preferred list.

When the desired Pulse Rate has been set press I/V to move to the next parameter.

Setting The Pulse On Time

The length of time (in seconds) each momentary pulse output remains "ON" (short circuit) may be programmed. A single setting is required to scale all three Meter pulse outputs.

Setting The Pulse Output Length of Time

Press kWh or kW to select the Next/Previous **Pulse On Time** from the preferred list.

When the desired Pulse Rate has been set press I/V to move to the next parameter.

Note: When selecting a long **Pulse On Time** it may be necessary to reduce the **Pulse Rate** to prevent pulses appearing permanently "ON".

Pulse Output Test Mode

This feature allows the pulse output hardware and external system connections to be commissioned without a measured load.

The test pulse rate is set automatically dependant on the programmed pulse length (maximum 0.5Hz).

Press kWh to start/stop the test pulses on all outputs.

Pulse Output Test OFF Mode

In this mode no pulses occur on P1-P3 and the display shows the total number of pulses accumulated during testing:

Pulse Output Test RUN Mode

In this mode pulses occur simultaneously on all three outputs with an Pulse On Time set in programming mode above. The Pulse Rate is set automatically to be greater than twice the Pulse On Time.

The display shows the total number of pulses accumulated during testing

Press kWh or kW together to stop the test pulses and simultaneously reset the test counter.

When the test is complete press I/V to move to the next parameter.

Note: When selecting a long **Pulse On Time** it may be necessary to reduce the **Pulse Rate** to prevent pulses appearing permanently "ON".

Display Scaling

The units, kWh or MWh and the position of the decimal point for the energy/power displays are automatically set dependant on the **CT Primary** setting for the meter.

The display pages are scaled as follows:

CT Primary	*Display Resolution*			
	Amps	*Volts*	*Power*	*Energy*
<10 A	0.001A	0.1V	0.001kW	0.001kWh
=10 A	0.01A	0.1V	0.001kW	0.001kWh
<=80 A	0.01A	0.1V	0.01kW	0.01kWh
<=100 A	0.1A	0.1V	0.01kW	0.01kWh
<=800 A	0.1A	0.1V	0.1kW	0.1kWh
<=1,000 A	1A	0.1V	0.1kW	0.1kWh
<=8,000 A	1A	0.1V	1kW	1kWh
<=10,000 A	0.01kA	0.1V	1kW	1kWh
<=25,000 A	0.01kA	0.1V	0.01MW	0.01MWh

Installation

Mounting On A Rail

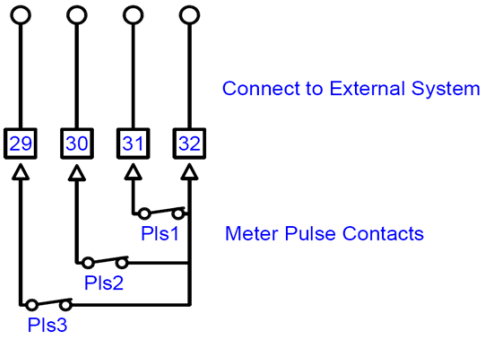
The ***AEM 3X1*** conforms to DIN 43880, 6-Module Wide. The unit is therefore compatible with a number of standard distribution systems with 45mm cut-outs. The meter should be mounted on a 35mm symmetrical ("Top-Hat") DIN rail of minimum length 106mm.

Pulse Output Connection

The pulse outputs take the form of isolated volt free normally open contacts.

The pulse output circuit is isolated from all other circuits at 2.5kV / 1 minute.

The pulses can be used as an input to a remote counter, pulse logger, building energy management system etc.

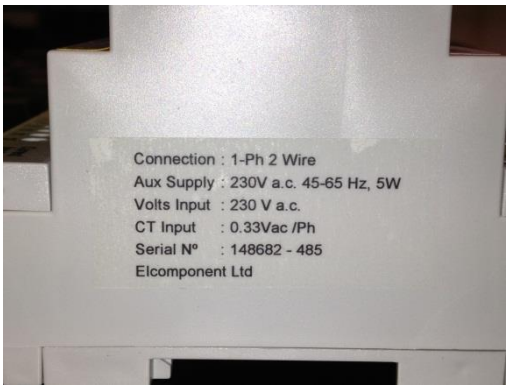


Pulse Output Connections

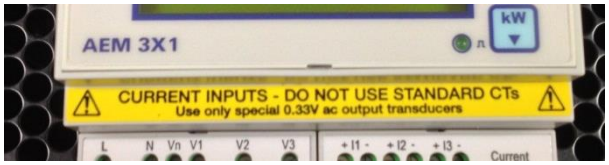
Connecting Up

AEM3X1: This meter is designed for use with standard current transformers with 5 Amp secondaries.

AEM3X1 V: This meter is designed for use with voltage output CT's with 0.33V secondaries. The V type meter is identified by the following labels:


Connection : 1-Ph 2 Wire
Aux Supply : 230V a.c. 45-65 Hz, 5W
Volts Input : 230 V a.c.
CT Input : 0.33Vac /Ph
Serial Nº : 148682 - 485
Elcomponent Ltd

Positioned on the right-hand side of the meter.



Positioned above the bottom terminals.

THE METERS ARE NOT INTERCHANGEABLE, AND MUST BE USED WITH THE CORRECT CT TYPE.

Additional Notes on Voltage output CT's

These devices have a maximum output of 0.33VAC. The use of any other type of CT will result in damage to the meter, the CT, or both, and may present a danger to the operator.

The CTs must be fitted to the conductor with the correct orientation, and must be wired to the meter with the correct polarity. The devices may not carry an arrow to indicate the flow sense of the current, in which case orientation should be as shown in the diagram below. There are two moulding types as shown.

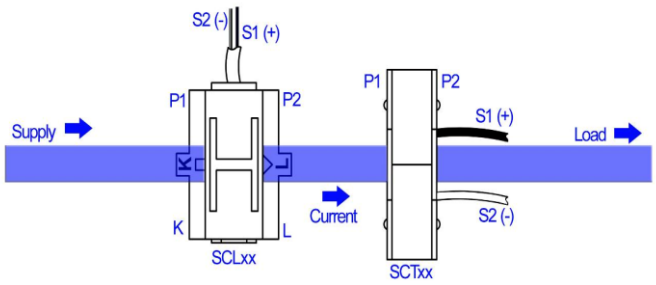
Type 1: This type has the output cable exiting from the base of the moulding. Viewed from the top, the marking 'K' and 'L' are visible as shown. Ensure that the CT is positioned onto the conductor with the 'L' marking facing towards the load.

Type 2: this type has the output cable exiting from the side of the moulding. Ensure that the CT is positioned with the cable exit face facing towards the load.

The polarity of the cables does not follow convention and is as follows:

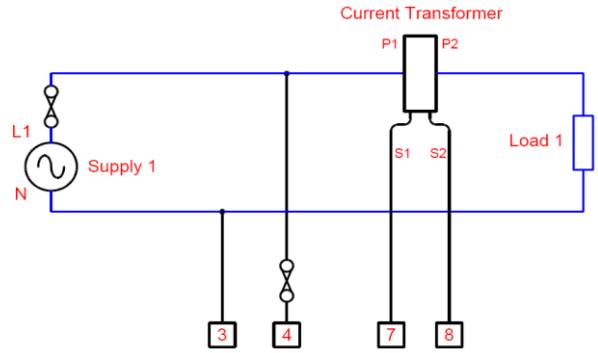
Type 1:	+	ve = BLACK
	-	ve = BLACK/WHITE
Type 2:	+	ve = BLACK
	-	ve = WHITE

Ensure that polarity is respected when connecting to the meter.

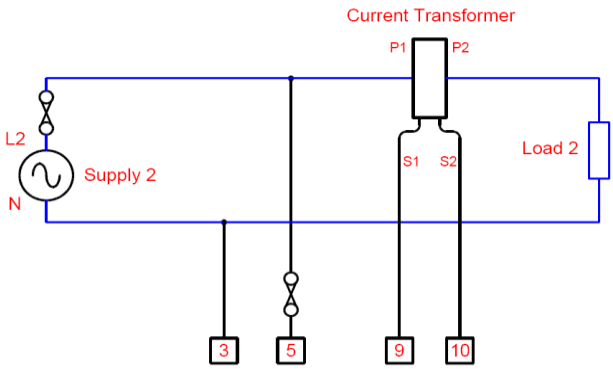


Measurement Input Connections Standard CTs

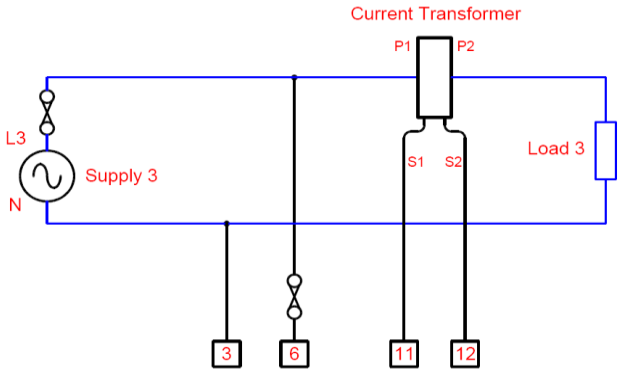
Separate reference voltages (Loads on different phases)



Meter 1 Measurement Input Connections

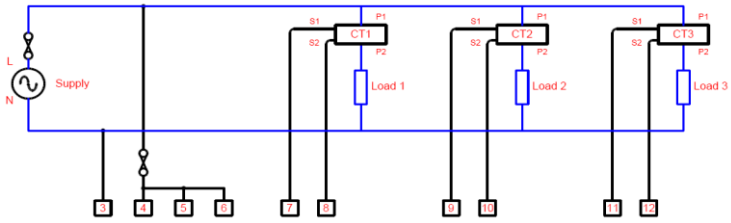


Meter 2 Measurement Input Connections



Meter 3 Measurement Input Connections

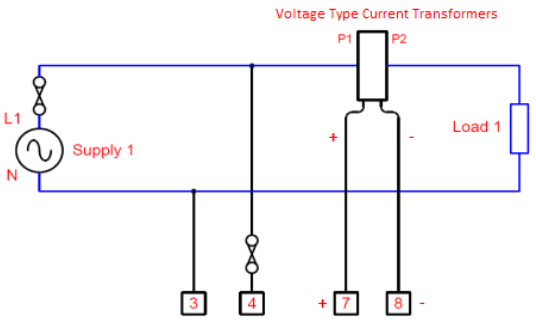
Common Reference Voltage (All loads on same phase)



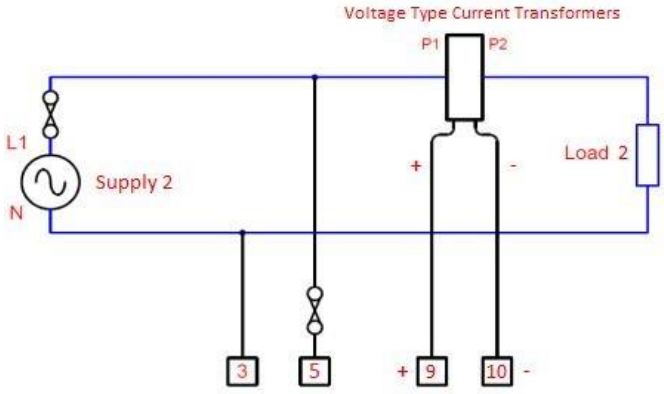
Meters 1-3 With Common Voltage Input

Measurement Input Connections Voltage Type CTs

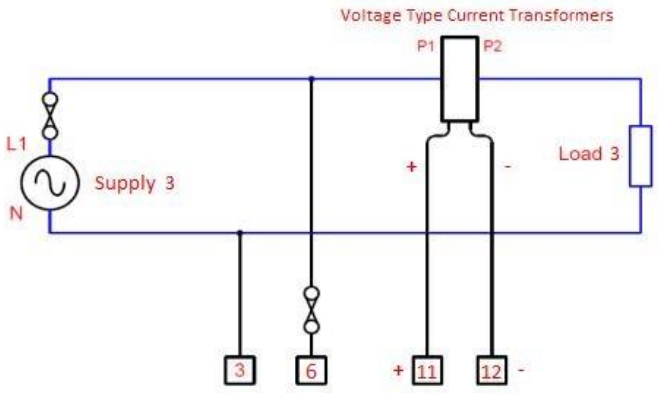
Separate reference voltages (Loads on different phases)



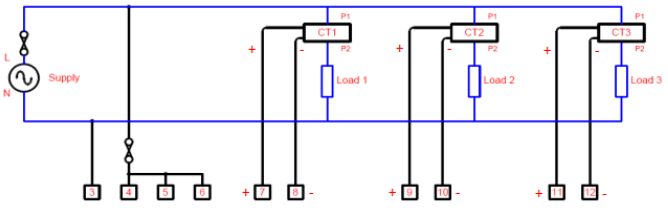
Meter 1 Measurement Input Connections



Meter 2 Measurement Input Connections



Meter 3 Measurement Input Connections



Meters 1-3 With Common Voltage Input

Voltage Measurement Input Fuses

It is recommended to fit a fuse/circuit-breaker to each voltage measurement input. This allows the *AEM 3X1* to be isolated should maintenance be required.

Reference Voltage

The CT phase and reference voltage phase must match in all cases.

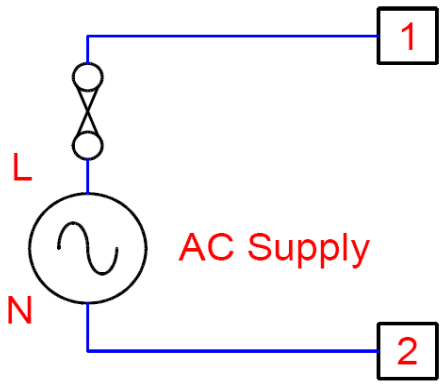
Common Neutral

The voltage measurement inputs must be sourced from a supply with a common neutral point. Suitable circuits include; several feeders off a single-phase circuit or individual phases of a 3-phase 4 wire supply.

Auxiliary Meter Supply

The *AEM 3X1* requires an ac supply to power the measurement circuit and display. This can be any AC supply meeting the specification stated on the units rating label.

It is acceptable to cross connect the meter supply with one of the voltage measurement inputs providing the specified ratings are not exceeded.



AEM 3X1 Unit Auxiliary Supply

Auxiliary Supply Fuse

The auxiliary supply is not fused internally in the *AEM 3X1*. An external fuse must be fitted.

External Auxiliary Supply fuses should be rated:

No of AEM 3X1 Units	*Fuse Rating*
1-10	**250V / 500mA Anti-Surge**
11-20	**250V / 1A Anti-Surge**
20-50	**250V / 2.5A Anti-Surge**
>50	**Use multiple fuses as above**

ELCOMPONENT
Making sense of your energy

Unit 5 Southmill Trading Centre, Southmill Road, Bishop's Stortford, Herts. CM23 3DY
01279 503173
www.elcomponent.co.uk 04.08.14

Specification

INPUTS		
System	3 Loads with a common neutral	
Voltage Un	Standard:	3 x 230Vac
	Optional:	3 x 120Vac
Current In	Standard:	5A from external CTs.
	Or	
	0.333V from external current sensors	
Measurement Range	Voltage	50% to 120%
	Current	0.2% to 120%
Frequency Range	Fundamental	45 to 65Hz
	Harmonics	Up to 30th harmonic at 50Hz
Burden	Voltage	<0.1VA per meter
	Current	<0.1VA per meter
Overload	Voltage	x2 for 1 hour
	Current	x20 for 0.5 second max
DISPLAY		
Type	Custom, Supertwist, LCD	
Data Retention	10 years min. Stores kWh & Meter set-up	
Format	8 x 9mm high digits with DPs & 2.8mm legends	
Scaling	Direct reading. User programmable CT	
	CT Primary programmable from 5A to 25,000A	
Legends	kWh, MWh etc. depending on user settings	
AUXILIARY SUPPLY		
Standard	230V 50/60 Hz ±15%	
Options	115V 50/60 Hz ±15%	
Load	2VA max.	
Overload	x1.2 continuous	
ACCURACY	**All errors ± 1 digit**	
kWh	Better than Class 1 per EN 62053-21 & BS 8431	
kW	Better than Class 0.25 IEC 60688	
Amps & Volts	Class 0.1 IEC 60688 (0.01In – 1.2In or 0.1Un – 1.2Un)	
PF (ModbusOnly)	±0.2° (0.05In – 1.2In and 0.2Un – 1.2Un)	
PULSE OUTPUTS		
Function	1 Pulse per unit of energy	
Pulse Rate	Settable between 1 & 1000 counts of kWh register	
Pulse On Time	0.1 sec. default; Settable between 0.1 and 20 sec	
Rise & Fall Time	< 2.0ms	
Type	N/O Volt free contact. Optically isolated BiFET	
Contacts	100mA ac/dc max., 100V ac/dc max: 0.5W Max Load	
Isolation	2.5kV 50Hz 1 minute	
MODBUS® Serial Communications		
Bus Type	RS485 2 wire + 0v. ½ Duplex, ¼ unit load	
Protocol	MODBUS® RTU with 16 bit CRC	
Baud Rate	4800, 9600 or 19,200 User settable	
Address	1 – 247 User settable	
Latency	Reply within 250ms max.	
Command Rate	New command within 5ms of previous one	
GENERAL		
Temperature	Operating	-10°C to +55°C
	Storage	-25°C to +70°C
Humidity	< 75% non-condensing	
Environment	IP20	
MECHANICAL		
Terminals	Rising Cage. 4mm2 (12 AWG) cable max.	
Enclosure	DIN 43880, 6-Modules Wide	
Material	Noryl® with fire protection to UL94-V-O. Self extinguishing	
Dimensions	106 x 90 x 58mm (Cut out 106 x 45mm)	
Weight	~ 250 gms	
SAFETY		
Conforms to	EN 61010-1 Installation Category III	